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PESTICIDE SPECIAL INVESTIGATION GUIDELINES, BIOLOGICAL AND ENVI--ETC(U)
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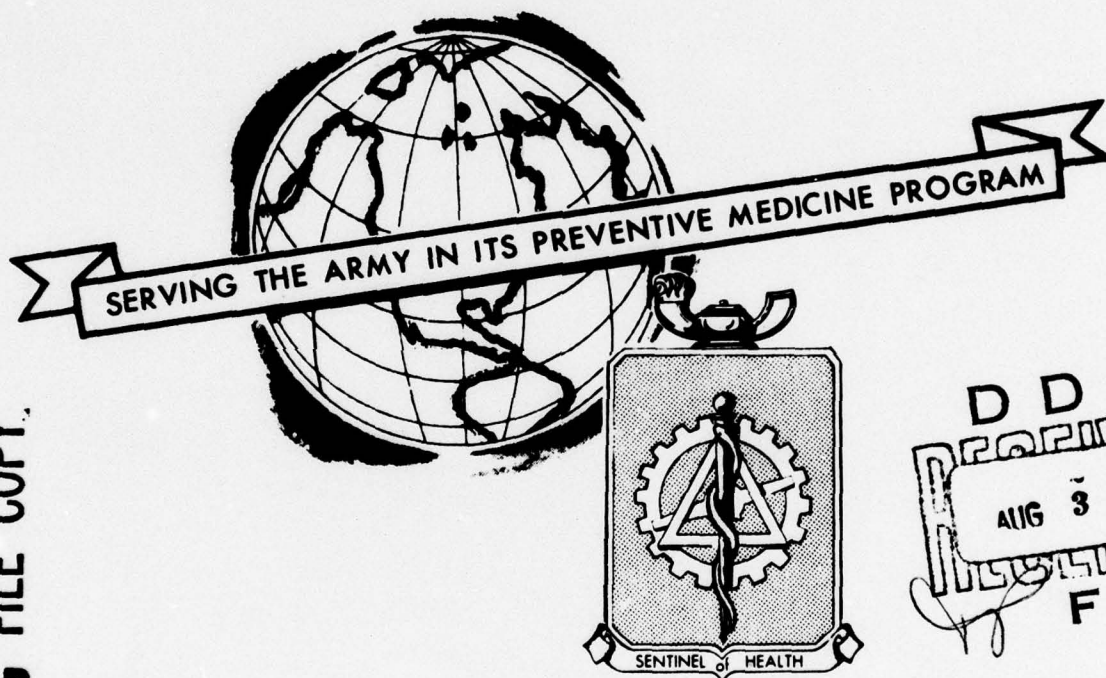
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LEVEL 15

PESTICIDE SPECIAL INVESTIGATION GUIDELINES 44-0801-78
BIOLOGICAL AND ENVIRONMENTAL SAMPLING AND EVALUATION IN THE
INVESTIGATION OF ALLEGED PESTICIDE INCIDENTS
JUNE 1978

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 44-0801-78	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Pesticide Special Investigation Guidelines, Biological and Environmental Sampling and Evaluation in the Investigation of Alleged Pesticide Incidents.		5. TYPE OF REPORT & PERIOD COVERED Special Report
6. PERFORMING ORG. REPORT NUMBER 44-0801-78		7. AUTHOR(s) Jack M. Heller
8. CONTRACT OR GRANT NUMBER(s)		9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD 21010
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) a. These guidelines contain sample collection procedures, sample container preparation and shipment procedures, a listing of pertinent information to be supplied with samples, and medical guidelines if humans are involved. A listing of previous environmental incidents involving pesticides is also included. b. A study of previous incidents indicated the major problem in evaluating the data derived from environmental samples were inadequate background information. A sample data sheet is therefore being included with these guidelines to assist in obtaining all information pertinent to the incident.		

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20. ABSTRACT (continued)

c. The revised guidelines, with inclosed sample data sheet, will hopefully improve background information received with the samples and the integrity of the environmental samples. ↗

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010

Dr. Heller/pj/584-3613

21 JUL 1978

HSF-RP/WP

SUBJECT: Pesticide Special Investigation Guidelines 44-0801-78, Biological and Environmental Sampling and Evaluation in the Investigation of Alleged Pesticide Incidents, June 1978

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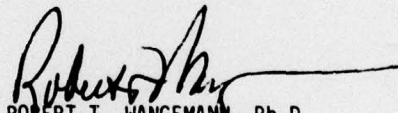
A summary of the pertinent findings and recommendations of the inclosed report follows.

a. These guidelines contain sample collection procedures, sample container preparation and shipment procedures, a listing of pertinent information to be supplied with samples, and medical guidelines if humans are involved. A listing of previous environmental incidents involving pesticides is also included.

b. A study of previous incidents indicated the major problem in evaluating the data derived from environmental samples were inadequate background information. A sample data sheet is therefore being included with these guidelines to assist in obtaining all information pertinent to the incident.

c. The revised guidelines, with inclosed sample data sheet (page 12), will hopefully improve background information received with the samples and the integrity of the environmental samples.

FOR THE COMMANDER:


ROBERT T. WANGEMANN, Ph.D.
LTC(P), MSC
Director, Radiation and
Environmental Sciences

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ABERDEEN PROVING GROUND, MARYLAND 21010

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PESTICIDE SPECIAL INVESTIGATION GUIDELINES 44-0801-78
BIOLOGICAL AND ENVIRONMENTAL SAMPLING AND EVALUATION IN THE
INVESTIGATION OF ALLEGED PESTICIDE INCIDENTS
JUNE 1978

1. REFERENCES.

- a. AR 200-1, Environmental Protection and Enhancement, 20 January 1978.
- b. USAEHA Pesticide Monitoring Special Study No. 44-111-76, Pesticide Monitoring Guidelines, Scheduled Monitoring, Effective 1 April 1976 (ADA 029983).
- c. USAEHA Pesticide Monitoring Guidelines No. 44-103-76, Environmental Sampling and Evaluation in the Investigation of Alleged Pesticide Incidents, April 1976.

2. PURPOSE. To provide an optimum investigative approach for biological and environmental sampling and analysis required by environmental insult or human, plant, or animal morbidity/mortality alleged to involve pesticides, that will provide data in support of decisions on:

- a. The specific pesticide or pesticides, if any, that are involved.
- b. The spatial distribution of the contaminant.
- c. Methods of confining the extent of the contamination.
- d. Methods of terminating or minimizing the continuing entry of the contaminating materials into the environment.
- e. The probable duration of the insult.
- f. Diagnosis, treatment, and followup, if any, of personnel involved.
- g. Methods to prevent similar future incidents.

3. BACKGROUND. During the period 1 January 1973 through 24 February 1978, there were 1327 samples referred to the USA Environmental Hygiene Agency (USAEHA) for evaluation to determine the extent, if any, of pesticides as environmental contaminants or in mortality or morbidity in some biological system. The distribution of these requests to various environmental components is presented in Table 1. The data in Table 2 indicate the situations where pesticides were confirmed as contributory to the incident or could be considered the probable cause of such incident.

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TABLE 1. SAMPLES SUBMITTED TO USAEHA FOR PESTICIDE ANALYSIS FROM 1 JANUARY 1973 TO 24 FEBRUARY 1978

Nature of Sample	Number of Samples
Air	50
Water	391
Sediment	198
Fish	83
Soil	111
Birds	24
Mammals	10
Marine Invertebrates	46
Other Animals	7
Blood	7
Landfill Leachates	9
Sewage	11
Foods	14
Unknown Pesticides	135
Unknown Liquids	4
Miscellaneous	67

4. PESTICIDE ENTRY INTO THE ENVIRONMENT. A simplified outline of methods of pesticide entry into the environment is presented in Table 3. It is not possible to provide realistic estimates as to which route provides the greatest environmental burden on either an acute or chronic basis.

a. The terrestrial environment is frequently the deliberate or incidental recipient. In many situations the soil becomes an intermediate reservoir.

b. The aquatic environment, surface waters, may receive pesticides as a result of deliberate action to reduce objectionable populations of aquatic flora and fauna.

c. The atmosphere generally acts as a transport medium from the actual point of release to the target area. The distances involved may be a few centimeters to several thousand meters.

d. Subsequent translocation from the target area or failure to reach the target area by part or all of the intended dose may result from unanticipated atmospheric conditions.

(1) Translocation may be vertical and/or horizontal.

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TABLE 2. INCIDENTS WHERE PESTICIDES OR POLYCHLORINATED BIPHENYLS CONFIRMED AS CONTRIBUTORY OR PROBABLE CAUSES*

Where	What	Why
Okinawa	Fish	Improper Storage of Pesticides
Fort Leavenworth, KS	Fish	Excessive Use on Golf Course
Fort McPherson, GA	Fish	Excessive Use on Golf Course
White Sands Missile Range, NM	Birds	Excessive and Improper Use
Fort Lee, VA	Ground Water	Improper Disposal Techniques
Iowa Army Ammunition Plant, Burlington, IA	Soil Water	Improper Disposal Techniques
Fort Dix	Sediment Water	Willful Dumping
Fort Monroe	Fish Water	Improper Cleanup of Spill
Kwajalein Atoll	Sediment Sand Filter in Drinking Water System	Under Investigation
Redstone Arsenal	Soil Sediment Wildlife Water	Improper Disposal and Manufacturing Plant Shut-down
Pine Bluff Arsenal	Soil	Improper Storage/Disposal
Fort Stewart	Sediment	Improper Aircraft Loading
Fort Eustis	Water from Sewer System	Improper Disposal
Barstow, CA, Storage Depot	Soil	Improper Storage/Disposal

* In addition to the investigation of incidents involving pesticides, those where polychlorinated biphenyls (PCB's) are involved are also studied.

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TABLE 3. ENTRY OF PESTICIDES INTO THE ENVIRONMENT

-
- A. Intentional Introductions
 - 1. Control of objectionable flora and/or fauna
 - 2. Industrial wastes
 - a. Manufacture and formulation
 - b. Food and fiber processing
 - 3. Disposal of excess or unused materials
 - 4. Onsite cleaning of application equipment
 - 5. Decontamination procedures
 - B. Unintentional Introductions
 - 1. Drift associated with application
 - 2. Secondary relocation via wind/water erosion
 - 3. Irrigation waters
 - 4. Transport accidents
 - 5. Application accidents
 - a. Missed targets
 - b. Improper chemicals
 - 6. Improper use
 - 7. Improper storage
 - 8. Improper disposal
-

(2) Wind erosion subsequent to application may contribute to detectable spread of pesticides resulting in environmental contamination.

(3) Water erosion and/or leaching may contribute to ultimate contamination of the aquatic environment.

(4) Rarely does leaching contribute to contamination of ground water. Certain disposal and storage practices may, however, result in such contamination.

5. ENVIRONMENTAL SAMPLING. The purpose of environmental sampling is to determine the qualitative and quantitative pesticide distributions in a temporal and spatial context. Three spatial and two temporal dimensions may be involved. There are generally two sampling phases.

a. Initial sampling of the plants or animals (body fluids and tissues from large animals) possibly affected and samples of related environmental components that may have acted as "carriers" or be serving as reservoirs of the contaminants.

b. Sampling following the determination of the extent of pesticide involvement. These samples may be required for several reasons.

(1) Has the contamination spread further than initially determined?

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(2) Has the corrective action that was initiated been successful in containing the contaminant?

(3) What qualitative and quantitative changes have occurred in the initial environment?

c. To determine the probable source(s) of a pesticide incident involving plants or animals (with a restricted mobility), the search patterns of highest probability are as follows:

(1) Upstream

(2) Uphill

(3) Upwind

d. To determine the probable direction of movement from a known or suspected source of contamination, the search pattern is reversed.

(1) Downstream

(2) Downhill

(3) Downwind

e. The concepts outlined above will assist in determining the spatial distribution of pesticides in the environment. Determination of the temporal distributions will require subsequent sampling in the same zones employed for the initial sampling.

(1) Additional zones may be added if continued spreading, or lack thereof, is to be determined.

(2) Additional sampling zones must always be a supplement to, not a substitute for, the initial zones if the data are to be of optimum value.

f. Resampling to determine the efficacy of corrective actions that may be recommended.

(1) In the event further plant or animal illness or death is observed.

(2) To establish trends for pesticide residues when such data are generally lacking, or lacking for a particular environmental component of special interest.

6. POSSIBLE HUMAN INTOXICATION WITH PESTICIDES. In cases where there is the possibility that humans have been intoxicated with pesticides, measures in addition to environmental sampling (including collection of samples from animals or plants, if applicable) should be undertaken. These procedures

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will allow for proper evaluation of the incident by establishing an orderly means for obtaining information about the individuals involved and providing for timely and appropriate workup, treatment, and followup, if indicated, for personnel potentially intoxicated with pesticides.

a. All individuals who have been potentially intoxicated in an alleged pesticide incident should be identified as quickly as possible. Their names, addresses, telephone numbers, complaints, and all other pertinent information should be recorded by the individual investigating the incident.

b. The nearest medical treatment facility (MTF) should be notified as quickly as possible of any incident in which human intoxication with pesticides is suspected. Any individual identified as being possibly intoxicated should be referred to the MTF, and copies of these guidelines should be made available to that facility. Collection of appropriate biological samples from patients with possible pesticide intoxication should be performed as quickly as possible at the MTF and submitted to this Agency for analysis. All background information concerning each patient, as well as the history, results of the physical examination, and any routine laboratory studies performed should accompany any biological samples submitted.

c. Biological samples obtained as soon as possible following alleged pesticide incidents often provide extremely valuable information in establishing the diagnosis of intoxication of individuals involved as well as indicating appropriate therapy and followup. Depending on the situation, various types of biological samples may be required.

(1) Incidents involving potential human morbidity:

(a) Blood (ca 10 ml)

(b) Urine - timed or grab (10-100 ml)

(c) Adipose tissue biopsy (50 gms) - This procedure should only be performed after consultation with this Agency.

(d) Gastric contents (100 ml) - only if gastric lavage is clinically indicated.

(2) Incidents involving fatalities:

(a) Body fluids - blood, urine, gastric contents, others (10-100 ml)

(b) Body tissues - adipose, liver, kidney, brain (50 gms)

d. Individuals investigating alleged pesticide incidents in which there is any question of possible human involvement should consult this Agency concerning appropriate steps to be taken. Personnel at MTF's handling patients potentially intoxicated in an alleged pesticide incident may also

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consult this Agency concerning any aspect of the evaluation, diagnosis, therapy, or followup of involved personnel. Initial contact should be made with the Pesticide Monitoring Branch (AUTOVON 584-3613/2177, Monday through Friday. In the event of emergencies at any time, telephone AUTOVON 584-4375, or Commercial 301-671-4375. Indicate the nature of the emergency and contact telephone numbers, both AUTOVON and commercial.

7. INFORMATION TO ACCOMPANY BIOLOGICAL OR ENVIRONMENTAL SAMPLES. Examination of any biological or environmental sample for pesticide residues without supporting environmental data cannot be justified. If the residue information is to have any usefulness in any decision making process, it must be supplemented by a considerable amount of ancillary environmental and circumstantial information. The types of information that should accompany any unscheduled environmental sample are indicated in the following questions and the inclosed sample data sheet (page 12). These questions may not address specifically all situations. Variations in these basic questions will, however, permit field personnel on the scene to acquire essential information in a timely manner.

a. What happened? Which of the following were involved?

- (1) Man
- (2) Domestic animals
- (3) Wildlife
- (4) Plants
- (5) Water supplies
- (6) Other identifiable environmental components

b. What did the incident produce?

- (1) Mortality
- (2) Morbidity
- (3) How many individuals were involved?
- (4) Environmental contamination representing an imminent hazard?

c. What pesticides are known or suspected to be involved?

d. Where did it happen?

- (1) On a military installation?
- (2) What part of the installation?

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(3) Adjoining or in the vicinity of a military installation alleged to result from a military operation?

e. When did it happen?

(1) Date and time or time span over which the effect was observed.

(2) Date and time when the alleged operational use or release occurred or is suspected to have occurred.

f. Why did the incident occur?

(1) Why was the pesticide at the time and place of the incident?

(2) How was the operation being conducted?

(3) How did the operation differ from similar operations that did not result in an adverse consequence?

(4) Who was conducting the operation?

(5) Who detected the adverse consequence?

(6) Who reported the adverse consequence?

8. SAMPLES USUALLY REQUIRED TO ESTABLISH THE EXTENT OF PESTICIDE INVOLVEMENT. With the exceptions noted below, solid samples of 1 kg and liquid samples of 1 liter are preferred.

a. Sickness Situations - Animals.

(1) Blood (Ca 10 ml)

(2) Urine - timed or grab (10-100 ml)

b. Death Situations - Animals.

(1) Body Fluids - blood, urine, gastric contents (10-100 ml)

(2) Body tissues - adipose, liver, kidney, brain (50 g)

c. Other Accident.

(1) Water

(2) Sediment

(3) Soil

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d. Plant Material.

- (1) Food or feed
- (2) Other environmental components

e. The collection and evaluation of water samples as an environmental indicator is expensive and may have little value but would be critical in situations of continuing release.

(1) Samples from flowing streams will generally reflect the status at the instant of sampling. Conditions (pesticide content) prevailing 1 hour prior or 1 hour subsequent to the sample collection may be quite different.

(a) If a water sample appears to be essential, it should always be accompanied by at least two sediment samples. One sample should be taken several meters upstream and one several meters downstream from the water sampling location.

(b) Water samples collected at sewer outfalls or stream junctions may require a different sediment sampling routine. The sampling routine must be designed to assist in determination of the source, if unknown, or the continuing release if the source location is known.

(2) Impounded bodies of water are also best evaluated by sediment samples.

f. The use of a vacuum cleaner to collect environmental dust (household dusts, etc.) can be employed to considerable advantage.

(1) The use of a clean vacuum cleaner, with a fresh bag, over a specific area provides a sample that can be evaluated with respect to environmental (living or working areas) contamination with pesticides.

(2) Acquisition of the bag from a currently used household vacuum cleaner provides an excellent opportunity for a retrospective evaluation of pesticide use patterns.

g. Air sampling may be a useful adjunct in areas where pesticides are stored, measured, or mixed introducing the probability of hazardous vapor or suspended particle contamination.

(1) Impinger trains, at least two impingers in series, containing propylene glycol as the trapping solvent are generally the most versatile.

(2) The airflow in the system should approximate that of an adult doing heavy work. A sampling period of 1 to 4 hours is generally adequate.

(a) The airflow and sampling period must be stated precisely.

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(b) The initial and final volume of the trapping solvent must be recorded so that corrections for evaporation or water acquisition may be used.

(3) Samples of the lot of trapping solvent should accompany the samples to permit evaluation of background or interfering materials.

9. SAMPLE CONTAINERS AND SHIPPING.

a. Questions concerning shipping scheduling arrangements and funding may be resolved by contacting the Pesticide Monitoring Branch (AUTOVON 584-3613, Commercial 301-671-3613) during normal duty hours.

b. IN THE EVENT OF EMERGENCIES outside of duty hours, telephone AUTOVON 584-4375 or Commercial 301-671-4375. Indicate the nature of the emergency and contact telephone numbers, both AUTOVON and Commercial.

c. Containers for human, plant, or animal tissues should be of glass with Teflon® cap liners. In the absence of Teflon liners, aluminum foil may be used.

(1) The use of plastic containers should be avoided to the extent consistent with the urgency of the situation. Some plastics contain materials that interfere with many pesticide analyses.

(2) Samples should be frozen as soon as possible after acquisition.

d. Containers for whole animal specimens may be of plastic. In these situations, the specimen should be wrapped in aluminum foil prior to freezing.

e. Containers for body tissues and fluids should preferably be of glass. Liquid specimens should not be frozen to mitigate against container breakage.

f. Shipments should be consigned to USAEHA, Building E2100, ATTN: Pesticide Monitoring Branch, Aberdeen Proving Ground, MD 21010.

(1) Shipments should be packed to prevent thawing during transit.

(2) Shipments should be made by the most expeditious means and routes available.

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(a) Shipments from the transportation officer (point of origin) to transportation officer, Aberdeen Proving Ground, normally arrive in an untimely manner and in unsatisfactory, if not unusable, condition.

(b) The costs of expedited air freight or air express shipment are unimportant when compared to the costs of sample acquisition and evaluation.


10. MAPS. Appropriate maps of the area where the incident occurred must be forwarded immediately to USAEHA Pesticide Monitoring Branch. These maps should indicate the site of the incident. In general, two maps should be provided.

a. 1:50,000 scale map.

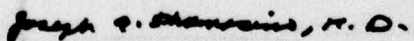
b. 1:400 or 1:1000 scale map.

c. One map should be a contour map.


d. For small areas, a sketch or floor plan, if appropriate, should be provided.


JACK M. HELLER, Ph.D.
Entomologist
Pest Management & Pesticide
Monitoring Division

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Chief, Pest Management & Pesticide
Monitoring Division

APPENDIX

PESTICIDE SPECIAL INVESTIGATION PROGRAM

PART I

INSTALLATION _____ DATE SUBMITTED _____
 OFFICE TO BE CONTACTED _____ PHONE: AV _____; COMM _____
 INDIVIDUAL TO BE CONTACTED _____ REPORT REQUIRED BY (date) _____
 REPORT IS REQUIRED TO SUPPORT DECISION ☐ FOR CORRECTIVE ACTIONS; ☐ TO SUPPORT LEGAL ACTION; ☐ FOR THE RECORD;
☐ IN CONNECTION WITH DIAGNOSIS AND THERAPY; _____

PART II

☐ INCIDENT DATE OCCURRED _____ PESTICIDE(S) INVOLVED (specify) _____
 WHICH OF THE FOLLOWING WERE INVOLVED? ☐ MAN; ☐ DOMESTIC ANIMALS (specify) _____;
☐ FISH; ☐ BIRDS (specify) _____; ☐ WILD ANIMALS (specify) _____;
☐ PLANTS (specify) _____; ☐ WATER SUPPLY; ☐ LAKE; ☐ STREAM; ☐ AIR; ☐ SOIL;
☐ SEDIMENT; ☐ FOOD (specify) _____; ☐ OTHER _____

LOCATION	INDOOR	OUTDOOR	LOCATION	INDOOR	OUTDOOR
RESIDENTIAL			RECREATION FACILITY (specify) _____		
OFFICE			PESTICIDE SHOP OR STORAGE		
INDUSTRIAL			WAREHOUSE		
SCHOOL			OTHER _____		
RANGE AND TRAINING					

NUMBER OF INDIVIDUALS INVOLVED _____

PART III

☐ SPECIAL SURVEY PESTICIDE(S) OF CONCERN _____

AREAS OF CONCERN

- ☐ RESIDENTIAL
☐ OFFICE
☐ SCHOOL
☐ WAREHOUSE
☐ RANGE AND TRAINING
☐ OTHER _____

- ☐ PESTICIDE SHOP OR STORAGE
☐ LANDFILL
☐ WASTE DISCHARGE
☐ INDUSTRIAL
☐ OUTLEASSED
☐ RECREATIONAL FACILITY (specify) _____

MATERIALS OF CONCERN

- ☐ SOIL
☐ SEDIMENT
☐ FISH (specify) _____
☐ OTHER _____

- ☐ DREDGE SPOIL
☐ VEGETATION

- ☐ WATER
☐ AIR
☐ BIRDS (specify) _____

- ☐ FOOD
☐ BEVERAGE

INSTRUCTIONS

PART I - Fill in blanks; check phrase(s) applicable.

FILL OUT ONLY ONE OF THE FOLLOWING: PART II FOR INCIDENT; PART III FOR SPECIAL SURVEY

PART II - Where appropriate, list the kind of animals, plants, foods or beverages involved. Number of individuals applies to man, animals, etc. to indicate extent of situation

PART III - Indicate specific or general classifications of pesticides

* Prepare detailed answers, as appropriate, to the questions in Pesticide Special Investigation Guidelines 44-0801-78 and forward with maps and this form to

Commander
 US Army Environmental Hygiene Agency
 ATTN: Manager Pesticide Special Investigations Program (HSE-RE-MO)
 Aberdeen Proving Ground, MD 21010